

**U.S. FISH AND WILDLIFE SERVICE  
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Myrsine fosbergii*

COMMON NAME: Kolea

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: August 2005

**STATUS/ACTION**

☐ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☒ 12-month warranted but precluded - FR date: May 11, 2005

☐ Did the petition request a reclassification of a listed species?

**FOR PETITIONED CANDIDATE SPECIES:**

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov>).

☐ Listing priority change

Former LP: ☐

New LP: ☐

Date when the species first became a Candidate (as currently defined): 1999

☐ Candidate removal: Former LP: ☐

☐ A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

- \_\_\_ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
- \_\_\_ F – Range is no longer a U.S. territory.
- \_\_\_ I – Insufficient information exists on biological vulnerability and threats to support listing.
- \_\_\_ M – Taxon mistakenly included in past notice of review.
- \_\_\_ N – Taxon does not meet the Act’s definition of “species.”
- \_\_\_ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Myrsinaceae (Myrsine family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, islands of Oahu and Kauai

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, islands of Oahu and Kauai

LAND OWNERSHIP: State and private lands.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul\_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Christa Russell, 808-792-9400, christa\_russell@fws.gov

#### BIOLOGICAL INFORMATION:

Species Description *Myrsine fosbergii* is a branched shrub or small tree 2 to 4 meters (m) (6.7 to 13 feet (ft)) tall. Branches are dark reddish brown and glabrous. Leaves are dark green, dark purple at the base, clustered at the tips of the branches, narrowly elliptic, and glabrous. Flowers are perfect or possibly unisexual (and then plants are dioecious), arising on short woody knobs among the leaves. Drupes are purplish black, globose and 6 to 9 millimeters (0.2 to 3.5 inches) in diameter (Wagner *et al.* 1999a).

Taxonomy *Myrsine fosbergii* was described by Hosaka. This species is recognized as a distinct taxon in Wagner *et al.* (1999a) and Wagner and Herbst (2003).

Habitat Typical habitat is cloudswept ridges and wet forest between 610 and 830 m (2,000 to 2,725 ft) in elevation (David Lorence, National Tropical Botanical Garden, Joel Lau, Hawaii Natural Heritage Program, and John Obata, pers. comms. 1995; Wagner *et al.* 1999a).

Historical and Current Range/Current Status This species is known from at least five populations totaling 150 to 175 individuals on Kauai and the southeastern end of Castle Trail on Oahu, although there may be a few more populations in suitable habitat that is difficult to survey

due to the steep terrain (D. Lorence, J. Lau, and J. Obata, pers. comms. 1995; Kapua Kawelo, U.S. Army, pers. comm. 2005). While we do not know long-term population trends, it is reasonable to assume the populations have continued to decline, since not all of the threats are being managed throughout all of its range.

#### THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

This species is threatened by feral pigs (*Sus scrofa*) that degrade and destroy habitat (D. Lorence, J. Lau, and J. Obata, pers. comm. 1995). As early as 1778, European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. Past and present activities of introduced alien mammals are the primary factor altering and degrading vegetation and habitat on Oahu. Pigs are currently present on Oahu and four other islands, and inhabit rain forests and grasslands. While rooting in the ground in search of the invertebrates and plant material they eat, feral pigs disturb and destroy vegetative cover, trample plants and seedlings, and threaten forest regeneration by damaging seeds and seedlings. They disturb soil and cause erosion, especially on slopes. Alien plant seeds are dispersed on their hooves and coats as well as through their digestive tracts, and the disturbed soil is fertilized by their feces, helping these plants to establish. Pigs are a major vector in the spread of many introduced plant species (Smith 1985; Stone 1985; Cuddihy and Stone 1990; Medeiros *et al.* 1986; Scott *et al.* 1986; Tomich 1986; Wagner *et al.* 1999a). No known conservation actions have been taken to date for this threat.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

None known.

C. Disease or predation.

Because Hawaii's native plants evolved without any browsing or grazing mammals present, many lost natural defenses to such impacts (Carlquist 1980, Lamoureux 1994). Browsing by ungulates has been observed on many other native species, including common and rare or endangered species (Cuddihy and Stone 1990; Loope *et al.* 1991). Therefore, even though we have no evidence of browsing for this species, it is likely that pigs impact this species directly as well as their indirect impacts to the surrounding habitat. No known conservation actions have been taken to date for this threat.

D. The inadequacy of existing regulatory mechanisms.

Pigs are managed as a game animal in Hawaii. Pig hunting is allowed on all islands either year-round or during certain months, depending on the area (Hawaii Department of Land and Natural Resources n.d.-a, n.d.-b, n.d.-c, n.d.-d). However, public hunting does not adequately control the number of ungulates to eliminate this threat to native plant species. No other known conservation actions have been taken to date for this threat.

E. Other natural or manmade factors affecting its continued existence.

This species is threatened by alien weeds that compete with it and degrade habitat (D. Lorence, J. Lau, and J. Obata, pers. comms. 1995).

The original native flora of Hawaii consisted of about 1,400 species, nearly 90 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 taxa, 47 percent were introduced from other parts of the world, and nearly 100 species have become pests (Smith 1985; Wagner *et al.* 1999a). Several studies (Cuddihy and Stone 1990; Wood and Perlman 1997; Robichaux *et al.* 1998) indicate nonnative plant species may outcompete native plants similar to *Myrsine fosbergii*. Competition may be for space, light, water, or nutrients, or there may be a chemical inhibition of other plants (Smith 1985; Cuddihy and Stone 1990). In addition, nonnative pest plants found in habitat similar to that of this species have been shown to make the habitat less suitable for native species (Smathers and Gardner 1978; Smith 1985; Loope and Medeiros 1992; Medeiros *et al.* 1992; Ellshoff *et al.* 1995; Meyer and Florence 1996; Medeiros *et al.* 1997; Loope *et al.* 2004). In particular, alien pest plant species modify habitat by modifying availability of light, altering soil-water regimes, modifying nutrient cycling, or altering fire characteristics of native plant communities (Smith 1985; Cuddihy and Stone 1990; Vitousek *et al.* 1987). Because of demonstrated habitat modification and resource competition by nonnative plant species in habitat similar to habitat of *Myrsine fosbergii*, the Service believes nonnative plant species are a threat to *Myrsine fosbergii*. The remaining unmanaged populations of *Myrsine fosbergii* are still impacted by this threat.

#### CONSERVATION MEASURES PLANNED OR IMPLEMENTED

The Koolau Watershed Partnership was provided Service funding in 2005 to fence and remove ungulates from the Helemano area of Oahu, which will benefit this species once these actions are implemented (Koolau Mountains Watershed Partnership 2005).

The Hawaii Natural Heritage Program identified this species as critically imperiled (Hawaii Natural Heritage Program Database 2004). Based on the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this species is recognized as Rare (could be considered at risk) by Wagner *et al.* (1999b).

#### SUMMARY OF THREATS:

The major threats to this species include feral pigs that directly prey upon it and degrade and destroy habitat, and nonnative plants that compete for light and nutrients, which are believed to be a major cause of the decline of this species throughout its range. No conservation efforts have been initiated to date.

#### LISTING PRIORITY

| THREAT      |                 |                       |           |
|-------------|-----------------|-----------------------|-----------|
| Magnitude   | Immediacy       | Taxonomy              | Priority  |
| <b>High</b> | <b>Imminent</b> | Monotypic genus       | 1         |
|             |                 | <b>Species</b>        | <b>2*</b> |
|             | Non-imminent    | Subspecies/population | 3         |
|             |                 | Monotypic genus       | 4         |
|             |                 | Species               | 5         |
|             |                 | Subspecies/population | 6         |

|                    |              |                       |    |
|--------------------|--------------|-----------------------|----|
| Moderate<br>to Low | Imminent     | Monotypic genus       | 7  |
|                    |              | Species               | 8  |
|                    |              | Subspecies/population | 9  |
|                    | Non-imminent | Monotypic genus       | 10 |
|                    |              | Species               | 11 |
|                    |              | Subspecies/population | 12 |

**Rationale for listing priority number:**

*Magnitude:*

This species is highly threatened by feral pigs that directly prey upon it and degrade and destroy habitat, and nonnative plants that compete for light and nutrients. Threats to the cloud swept ridges and wet forest habitat of *Myrsine fosbergii* and to individuals of this species occur throughout its range and are expected to continue or increase without control or eradication. No conservation efforts have been initiated to date.

*Imminence:*

Threats to *Myrsine fosbergii* from feral pigs and nonnative plants are imminent because they are ongoing.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. In addition, the conservation actions that will be implemented by the Koolau Watershed Partnership will benefit the individuals in the Helemano area on Oahu. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of *M. fosbergii* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

**DESCRIPTION OF MONITORING:**

Much of the information in this form is based on the results of a meeting of 20 botanical experts held by the Center for Plant Conservation in December of 1995, and was updated by personal communication with David Lorence of the National Tropical Botanical Garden, Joel Lau of the Hawaii Natural Heritage Program, and John Obata, a highly respected amateur botanist in 1995. We have incorporated additional information on this species from our files and the most recent supplement to the *Manual of the Flowering Plants of Hawaii* (Wagner and Herbst 2003). In 2004, the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art C. Medeiros, U.S.G.S. Biological Resources Discipline; Hank Oppenheimer, resource manager for Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, National Tropical

Botanical Garden. No new status and range information was provided in 2004. In 2005 we contacted the species experts listed below and confirmation of the status of *Myrsine fosbergii* was provided by Kapua Kawelo, U.S. Army.

The Hawaii Natural Heritage Program identified this species as critically imperiled (Hawaii Natural Heritage Program Database 2004). Based on the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this species is recognized as Rare (could be considered at risk) by Wagner *et al.* (1999b).

A species expert has provided new information confirming the status of the species this year and the results are included in this assessment

#### COORDINATION WITH STATES

In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for this species and provided no additional information or corrections (V. Caraway, pers. comm. 2005).

#### LITERATURE CITED

List all experts contacted:

| Name                | Date           | Place of Employment                      |
|---------------------|----------------|--|
| 1. Joel Lau         | June 28, 2005  | Hawaii Natural Heritage Program          |
| 2. Art Medeiros     | June 28, 2005  | U.S.G.S. Biological Resources Discipline |
| 3. Jim Jacobi       | June 28, 2005  | U.S.G.S. Biological Resources Discipline |
| 4. Rick Warshauer   | June 28, 2005  | U.S.G.S. Biological Resources Discipline |
| 5. Hank Oppenheimer | June 28, 2005  | Maui Land and Pineapple Company          |
| 6. Kapua Kawelo*    | June 28, 2005  | U.S. Army                                |
| 7. Dave Lorence     | June 28, 2005  | National Tropical Botanical Garden       |
| 8. Steve Perlman    | March 29, 2005 | National Tropical Botanical Garden       |
| 9. Ken Wood         | August 2, 2005 | National Tropical Botanical Garden       |
| 10. Marie Bruegmann | July 13, 2005  | U.S. Fish and Wildlife Service           |
| 11. Vickie Caraway  | June 14, 2005  | Hawaii Division of Forestry and Wildlife |

\*Provided new information on this taxon in 2005

List all databases searched:

| Name                               | Date |
|------------------------------------|------|
| 1. Hawaii Natural Heritage Program | 2004 |

Other resources utilized:

Carlquist, S. 1980. Hawaii: A natural history, 2nd edition. Pacific Tropical Botanical Garden, Honolulu. 468 pp.

Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May

- 4, 2004.
- Cuddihy, L.W., and C.P. Stone. 1990. Alteration of native Hawaiian vegetation; effects of humans, their activities and introductions. Coop. Natl. Park Resources Stud. Unit, Hawaii. 138 pp.
- Ellshoff, Z.E., D.E. Gardner, C. Wikler, and C.W. Smith. 1995. Annotated bibliography of the genus *Psidium*, with emphasis on *P. cattleianum* (strawberry guava) and *P. guajava* (common guava), forest weeds in Hawai'i. Cooperative National Park Resources Studies Unit, University of Hawaii. Technical Report 95.
- Hawaii, Department of Land and Natural Resources. N.d.-a. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Oahu. Division of Forestry and Wildlife, Honolulu. 2 pp.
- Hawaii, Department of Land and Natural Resources. N.d.-b. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Molokai. Division of Forestry and Wildlife, Honolulu. 2 pp.
- Hawaii, Department of Land and Natural Resources. N.d.-c. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Maui. Division of Forestry and Wildlife, Honolulu. 2 pp.
- Hawaii, Department of Land and Natural Resources. N.d.-d. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Kauai. Division of Forestry and Wildlife, Honolulu.
- Koolau Mountains Watershed Partnership. 2005. Helemano watershed management project, Oahu, Hawaii. Proposal to U.S. Fish and Wildlife Service for 2005 funding.
- Loope, L.L. and A.C. Medeiros. 1992. A new and invasive grass on Maui. Newsletter of the Hawaiian Botanical Society 31: 7-8.
- Lamoureux, C.H. 1994. Conserving Hawaiian biodiversity – the role of Hawaiian botanical gardens. Pp. 55-57. In: C.-I Peng and C.H. Chou (eds.). Biodiversity and Terrestrial Ecosystems. Institute of Botany, Academia Sinica Monograph Series No. 14.
- Loope, L.L., A.C. Medeiros, and B.H. Gagné. 1991. Recovery of Vegetation of a montane bog following protection from feral pig rooting. Coop. Natl. Park Resources Studies Unit, Univ. Hawaii/Manoa, Dept. Of Botany, Tech. Rept. 77.
- Loope, L., F. Starr and K. Starr. 2004. Management and research for protecting endangered Hawaiian plant species from displacement by invasive plants on Maui, Hawaii. Weed Technology 18: 1472-1474.
- Medeiros, A.C., L.L. Loope, P. Conant and S. McElvaney. 1997. Status, ecology, and management of the invasive plant, *Miconia calvescens* DC (Melastomataceae) in the Hawaiian Islands. Bishop Mus. Occas. Pap. 48: 23-36.
- Medeiros, A.C., L.L. Loope, T. Flynn, S.J. Anderson, L.W. Cuddihy, and K.A. Wilson. 1992. Notes on the status of an invasive Australian tree fern (*Cyathea cooperi*) in Hawaiian rain forests. American Fern Journal 82: 27-33.
- Medeiros, A.C., Jr., L.L. Loope, and R.A. Holt. 1986. Status of native flowering plant species on the south slope of Haleakala, East Maui, Hawaii. Coop. Natl. Park Resources Stud. Unit, Hawaii, Techn. Rept. 59: 1-230.
- Robichaux, R., J. Canfield, F. R. Warshauer, L. Perry, M. Bruegmann, and G. Carr. 1998. Adaptive Radiation. Endangered Species Bulletin. November/December.
- Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest bird communities

- of the Hawaiian Islands: Their dynamics, ecology, and conservation. *Studies in Avian Biology* 9: 1-429. Cooper Ornithological Society, Los Angeles.
- Smathers, G.A. and D.E. Gardner. 1978. Stand analysis of an invading firetree (*Myrica faya* Aiton) population, Hawai'i. *Proceeding of the Second Conference on Natural Science, Hawaii Volcanoes National Park*, pp. 274-288.
- Smith, C.W. 1985. Impact of alien plants on Hawai'i's native biota: *in* Stone, C.P., and J.M. Scott (eds.), *Hawai'i's Terrestrial Ecosystems: Preservation and Management*. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 180-250.
- Stone, C.P. 1985. Alien animals in Hawai'i's native ecosystems: toward controlling the adverse effects of introduced vertebrates: *in* Stone, C.P., and J.M. Scott (eds.), *Hawai'i's Terrestrial Ecosystems: Preservation and Management*. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 251-297.
- Tomich, P.Q. 1986. *Mammals in Hawai'i: A synopsis and notational bibliography*. Bishop Museum Press, Honolulu. 375 pp.
- Vitousek, P.M., C.M. D'Antonio, L.L. Loope, M. Rejnaneck, and R. Westerbrooks. 1997. Introduced species: a significant component of human-caused global change. *New Zealand Journal of Ecology* 21(1): 1-16.
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- Wagner, W.L., M.M. Brueggmann, and J.Q.C. Lau. 1999b. *Hawaiian vascular plants at risk: 1999*. Bishop Mus. Occas. Pap. 60: 1-58.
- Wagner, W.L. and D.R. Herbst. 2003. *Electronic supplement to the manual of flowering plants of Hawai'i*, version 3.1. December 12, 2003. Available from the Internet. URL: <http://rathbun.si.edu/botany/pacificislandbiodiversity/hawaiianflora/supplement.htm>.
- Wenkam, R. 1969. *Kauai and the park country of Hawaii*. Sierra Club, San Francisco. 160 pp.
- Wood, K.R. and S. Perlman. 1997. *Maui 14 plant survey final report*. Submitted by National Tropical Botanical Garden, October, 1997.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: **Acting** David W. Winkler 11/10/05  
Regional Director, Fish and Wildlife Service Date

Marshall P. Jones

Concur: \_\_\_\_\_ August 23, 2006  
Director, Fish and Wildlife Service Date

Do not concur: \_\_\_\_\_  
Director, Fish and Wildlife Service Date

Date of annual review: September 20, 2005  
Conducted by: Marie M. Bruegmann, Pacific Islands FWO  
Plant Recovery Coordinator

Comments:  
PIFWO Review

Reviewed by: Christa Russell Date: September 26, 2005  
Plant Conservation Program Leader

Gina Shultz Date: October 14, 2005  
Assistant Field Supervisor,  
Endangered Species

Patrick Leonard Date: October 14, 2005  
Field Supervisor